

Revision of the genera of Scolodontidae, part 2: *Guestieria* Crosse, 1872, *Xenodiscula* Pilsbry, 1919, and a misidentified planorbid

MARIJN T. ROOSEN¹ & ABRAHAM S.H. BREURE^{2,3,4}

¹ Natural History Museum of Rotterdam, Westzeedijk 345, NL-3015AA Rotterdam, the Netherlands

² Natural History Museum, Invertebrate Division, London SW7 5BD London, United Kingdom

³ Royal Belgian Institute of Natural History, Vautierstraat 29, B-1000 Brussels, Belgium

⁴ Naturalis Biodiversity Center, P.O. Box 9517, NL-2300RA Leiden, the Netherlands

Corresponding author: M.T. Roosen (marijn.roosen@gmail.com)

Abstract. Currently, there are many issues with genus-level taxa within the Scolodontidae. This is the second paper in a series which aims to resolve the most prominent issues. Here, we highlight some of the more poorly known, smaller, discoid genera: *Guestieria* Crosse, 1872 and *Xenodiscula* Pilsbry, 1919. *Guestieria* is characterized by its small to medium-sized shell (2–18 mm), without or with only faint sculpture, and with a covered apex and closed umbilicus. Its known geographic distribution is confined to Andean countries and Brazil. *Xenodiscula* is small (up to 1.6 mm), discoid, and with prominent apertural barriers not seen in other scolodontids. Its known geographic distribution included all of the Amazon rainforest, the Tumbes-Chocó-Magdalena hotspot, and mainland Central America. We also discuss the enigmatic *Guestieria shuttleworthi* (L. Pfeiffer, 1851), which we show is a junior synonym of the planorbid freshwater snail *Drepanotrema anatinum* (d'Orbigny, 1835).

Key words. *Guestieria* Crosse, 1872, *Xenodiscula* Pilsbry, 1919, South America, Gastropoda, *Drepanotrema anatinum* (d'Orbigny, 1835), *Helix shuttleworthi* L. Pfeiffer, 1851.

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INTRODUCTION

Within the Scolodontidae there are some genera that stand out due to their small size and discoid to nautiloid shape, which is reminiscent of small nautiloids. As most species belonging to these genera are small, they are often overlooked. A previous paper disentangling *Happia* Bourguignat, 1890 from other Scolodontidae (Roosen & Breure 2024) has already treated some of these genera, but two were not discussed yet: *Guestieria* Crosse, 1872 and *Xenodiscula* Pilsbry, 1919. In contrast to our previous paper on Scolodontidae (Roosen & Breure 2024), the genera discussed here have not been confused with each other and are easily distinguished. In fact, few malacologists have studied these genera thoroughly. *Guestieria* is the only land-snail genus in South America in which the preceding whorls are completely covered by the ultimate whorl (Crosse 1872; Breure *et al.* 2022). *Xenodiscula* is one of the smallest gen-

era occurring in Central and South America, and this genus is the only scolodontid with large parietal lamellae (Pilsbry 1919; Roosen *et al.* 2023).

Here, we redescribe *Guestieria* and *Xenodiscula* to facilitate the further study of these genera. In addition, we remove *Helix shuttleworthi* L. Pfeiffer, 1851 from *Guestieria* and demonstrate that it is in fact a freshwater planorbid, *Drepanotrema anatinum* (d'Orbigny, 1835).

MATERIALS AND METHODS

To revise the known scolodontid genera, we undertook a comprehensive study of all literature available to us containing information on these genera and examined the type specimens of the type species and most species occurring in Ecuador and Peru. The latter had previously been located and imaged for unrelated projects, and for that reason these materials were readily available to us for study (see Breure *et*

al. 2022 for the Ecuadorian malacofauna). Shell characteristics useful for identification are highlighted.

Specimens were imaged with scanning electron microscopes (SEM) and stereomicroscopes at the institutes where the specimens are housed. Measurements were taken to the nearest 0.1 mm during the imaging process or with vernier callipers. The shell height (H) was measured from the apex to the lower lip of the aperture, width (W) at the widest section perpendicular to the coiling axis, height of the aperture (HA) from the lowest point of the peristome to the upper part of the whorl, and the umbilical width (UW) at the widest section starting at the columella. All measurements are in millimetres. Whorls were counted to the nearest ¼ whorl following Gittenberger *et al.* (2004). Other abbreviations used in original descriptions and quoted verbatim by us are: largest diameter (Diam. maj.; D), smallest diameter (Diam. min.; D3), height (alt., long.), and width (lat.). Largest diameter (Diam. maj.) and latitude (lat.) are the equivalent of modern width.

For the two genera discussed in this paper, only the shells of the type species are known. Therefore, we only use conchological characteristics of the type specimens to define the genera. Molecular DNA and soft-tissue studies should be conducted, but these are beyond the scope of this paper. For all species treated in this paper, we have analysed type materials ourselves or have had access to high-quality images of the type specimens. Other taxa currently included in the genera discussed here should be treated as tentative members of these genera, pending further research. Specimens from the following museum collections were studied: Academy of Natural Sciences of Drexel University, Philadelphia, Pennsylvania, United States of America (ANSP); Field Museum of Natural History, Chicago, Illinois, United States of America (FMNH); Natural History Museum, London, United Kingdom (NHM, NHMUK).

SYSTEMATIC PART

Family Scolodontidae H.B. Baker, 1925

Scolodontidae Baker 1925: 88.

In this paper we discuss two similar scolodontid genera. To avoid their confusion with each other, we provide the most

important distinguishing conchological characteristics (Table 1).

Genus *Guestieria* Crosse, 1872

Guestieria Crosse 1872: 199.

Type species. *Helix powisiana* L. Pfeiffer, 1848, by monotypy.

Redescription. Shell minute to medium-sized (diameter 2–18 mm), transparent white or yellow, nautiloid in shape. Older whorls completely covered by last whorl; penultimate and previous whorls, including the protoconch not visible. Last whorl with minute growth lines, sometimes accompanied by vestigial spiral striae. Aperture trapezoid to lunulate; peristome simple, neither thickened nor reflected. Umbilicus always closed.

Included species. *Guestieria blandi* Pilsbry, 1930, *G. brannickii* Lubomirski, 1879, *G. isthmica* Pilsbry, 1930, *G. locardi* Jousseume, 1887, *G. martinida* Jousseume, 1887, *G. olssonii* Pilsbry, 1932, *G. powisiana* (L. Pfeiffer, 1848).

Distribution. Panama, Colombia, Peru, Ecuador, and Brazil.

Comparisons. *Occultator* Pilsbry, 1926 (type species *O. olssonii* Pilsbry, 1926, from Costa Rica) is somewhat similar, but it has an exposed spire. *Occultator* will be discussed in another paper, along with all genera currently included in the Tamayoinae.

Remarks. It is possible that the large-shelled species of *Guestieria* having a yellow periostracum (e.g. *G. powisiana*) are not congeneric to small, translucent species (e.g. *G. martinida*). However, we cannot find sufficient conchological characteristics to separate these groups. Genetic studies may help clarify the generic placement of the larger, yellow species.

The only described *Guestieria* species known from Brazil is re-identified by us as a planorbid freshwater snail. However, Barbosa (2014) reported an undescribed species from Ilha Grande and Teresópolis. Based on the photographs in that thesis, we confirm that it indeed belongs to *Guestieria*. We recommend the further study and formal description of this species, as it is the most eastern record of the genus and, therefore, is scientifically important.

Table 1. Key differences between *Guestieria* and *Xenodiscula*.

	Apex exposed	Apertural barriers present	Sculpture
<i>Guestieria</i>	No	No	Absent, or vestigial spiral sculpture
<i>Xenodiscula</i>	Yes	Yes	Axial grooves, parallel to growth lines

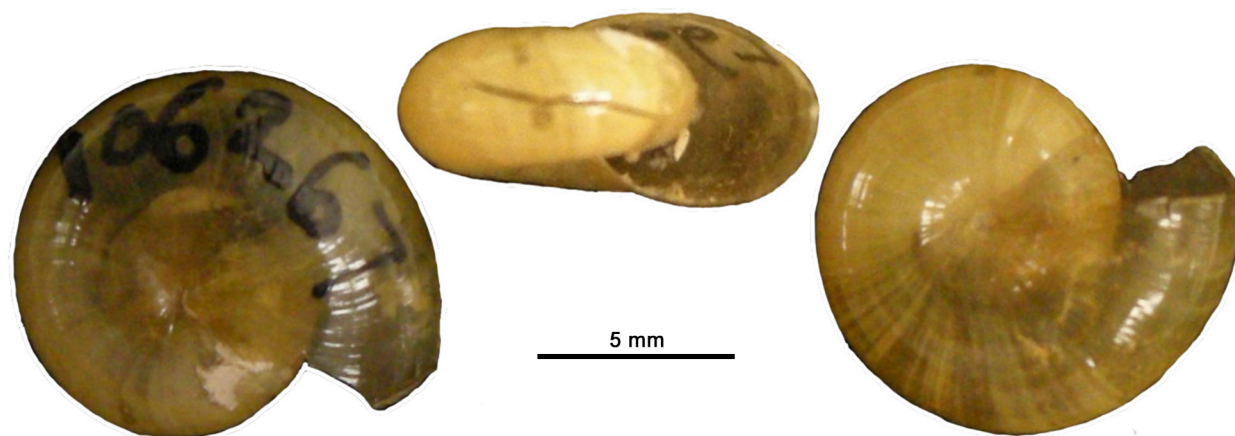


Figure 1. *Guestieria powisiana* (Pfeiffer, 1848), FMNH 106267 (non-type specimen), Lago Zurucuchu, 11 miles west of Cuenca, Azuay province, Ecuador.

***Guestieria powisiana* (L. Pfeiffer, 1848)**

Figure 1

Helix involuta Pfeiffer 1845: 65 (*non* Thomae, 1845).

Helix powisiana Pfeiffer 1848: 34.

Helix powisiana—Reeve 1852 [1851–1854]: pl. 109 fig. 612, pl. 110 fig. 622; Pfeiffer 1859: 15

Helix (Microcystis) powisiana—Pfeiffer 1855: 122.

Guestieria powisiana—Crosse 1872: 200, pl. 13 fig. 1; Kobelt 1879 [1879–1881]: 223, pl. 67 fig. 37; Tryon 1885: 113; Kobelt 1905 in Möllendorff & Kobelt 1903–1905: 76; Pfeiffer & Clessin 1881: 70; Crosse 1887: 8; Richardson 1989: 116; Ramírez 1993: 27; Breure *et al.* 2022: 104, fig. 131, 136.

Studied material. FMNH 106267 (1 shell, dry), Lago Zurucuchu, 11 miles west of Cuenca, Azuay province, Ecuador.

Type locality. “The mountains of Quendeu, New Granada” (now Quindío, a province of Colombia).

Redescription. Shell large for the genus, flat, nautiloid in shape, translucent yellow. Only last whorl could be studied; sculpture of minute growth lines, all nearly of the same strength, and some vestigial spiral grooves. Aperture broadly lunulate, with a thin, simple peristome. Umbilicus closed.

Dimensions. “Diam. maj. 18, min. 15, alt. $7\frac{1}{2}$ mill.” (Pfeiffer 1848).

Comparisons. *Guestieria powisiana* is much larger than most other *Guestieria* species. Only *G. branickii* and *G. locardi* are of similar size, but they differ in having a comparatively higher shell and less symmetrical aperture.

Distribution. Colombia: Quindio Province (type locality). Ecuador: Guayas Province, Guayaquil (Pfeiffer 1853); Azuay Province, W of Cuenca (FMNH).

Remarks. The type material of this species has not been

located (Breure *et al.* 2022). The description given here is based on Pfeiffer (1848), Crosse (1872), and FMNH 106267.

Genus *Xenodiscula* Pilsbry, 1919

Xenodiscula Pilsbry 1919: 206.

Type species. *Xenodiscula venezuelensis* Pilsbry, 1919, by monotypy.

Redescription. Shell minute (diameter 1.1–1.5 mm), discoid, transparent or whitish, with a sunken spire. Embryonic shell $\frac{1}{2}$ whorl, without sculpture. Each whorl partially covered by next one. Sculpture of numerous flexuous axial grooves and indistinct growth lines. Aperture crescent-shaped, with one or more parietal lamellae. Some species have palatal lamella. Outer peristome thin, simple. Umbilicus wide.

Species included in the genus. *Xenodiscula taintori* Goodrich & Van der Schalie, 1937; *X. venezuelensis* Pilsbry, 1919; *X. yumbo* Roosen *et al.* 2023.

Distribution. Belize, Guatemala, Nicaragua, Mexico, Venezuela, Peru and Ecuador (Roosen *et al.* 2023).

Comparisons. *Xenodiscula* is distinguished from all other scolodontids by its small, discoid shell having axial grooves (otherwise only seen in *Scolodonta interrupta* (Suter, 1900)) and large parietal lamellae.

Remarks. All species of *Xenodiscula* were recently revised (Roosen *et al.* 2023).

***Xenodiscula venezuelensis* Pilsbry, 1919**

Figure 2C

Xenodiscula venezuelensis Pilsbry 1919: 260, fig. 1

Xenodiscula venezuelensis—Wendebourg & Hausdorf 2019: 315; Roosen *et al.* 2023: 103, fig. 2,4,8,10.

Studied material. ANSP 105209 (type series, 10 shells, dry), Venezuela, Cariaquita, leg. Brown (14.03.1911).

Redescription. Shell, whitish-transparent, small, discoid, with a sunken spire. Early whorls partially covered by succeeding whorls. Embryonic shell *ca.* ½ whorl, without sculpture. Teleoconch sculpture of minute growth lines and irregularly spaced, slightly flexuous axial grooves, which are more crowded on oldest whorls. First ½ whorl of teleoconch with up to 19 grooves, while on younger whorls this number is reduced to 16 grooves per ½ whorl. Numerous weaker grooves are present in the spaces between grooves, aside from the shell's growth lines. Whorl profile weakly convex. Aperture broadly lunulate; peristome simple. Four lamellae present on parietal wall. with third lamella highest and three times as high as fourth lamella. Upper two parietal lamellae reduced to small ridges; fourth lamella well developed. One palatal lamella present, shaped like a rounded bulge. Two denticle-like lamella at the base of the aperture. Umbilicus wide, up to 39% of total width.

Dimensions. “Alt. 0.55, diam. 1.6 mm” (Pilsbry, 1919). H: 0.61 mm; W: 1.5 mm; whorls: 3 (Roosen *et al.* 2023).

Comparisons. Differs for *X. taintori* and *X. yumbo* by its less ovate aperture, larger size, denser, stronger sculpture, relatively wider umbilicus, and in having three or more lamella on the parietal wall.

Distribution. Colombia: without specific locality (Wendebourg & Hausdorf 2019). Peru: Paguana conservation area (Wendebourg & Hausdorf 2019). Venezuela: Cariaquita (Pilsbry 1919).

Remarks. A more elaborate version of this redescription was previously published by Roosen *et al.* (2023)..

Family Planorbidae Rafinesque, 1815

Genus *Drepanotrema* P. Fischer & Crosse, 1880

Type species. *Planorbis yzabalensis* Crosse & P. Fischer, 1879 (= *Drepanotrema anatinum* (d'Orbigny, 1835)), by subsequent designation (Dall 1905: 86).

Remarks. To our surprise, a freshwater snail was long accepted as a species of *Guestieria*. We give it the same thorough taxonomic treatment, as for scolodontids of unresolved status, to eliminate any confusion.

“*Helix*” *shuttleworthi* L. Pfeiffer, 1851, new synonym of *Drepanotrema anatinum* (d'Orbigny, 1835)

Figure 2A, B

Helix shuttleworthi Pfeiffer 1851: 14

Helix shuttleworthi—Reeve 1852 [1851–1854]: pl. 112 fig. 636; Pfeiffer 1853: 110; Pfeiffer 1854 [1852–1860]: 363, pl. 138 figs 11, 12.

Helix (Ammonoceras) shuttleworthi—Pfeiffer 1855: 122.

Guestieria shuttleworthi—Simone 2006: 230, fig. 876; Barbosa 2014: 6; Gomes 2017: 66.

Studied material. NHMUK 1991115 (syntypes, 5 shells, dry).

Type locality. “Bahia”, Brazil.

Redescription. Shell minute (diameter *ca.* 3 mm), translucent, with a deeply sunken spire. Spire deeply sunken, barely visible in a narrow apical umbilicus. Of the exposed part of the early whorls, the first half has no microsculpture besides and slightly flexuous growth lines. The rest of the shell is covered with spirally oriented papillae, which are denser on the base of the shell. Aperture slender crescent-shaped, with a thin, simple peristome. Umbilicus narrow, funnel-shaped, about 27% of total width.

Dimensions. “Diam. maj. 3, min. 2⅔, alt. 1½ mill.” (Pfeiffer 1851).

Distribution. Widespread all over South America (Breure *et al.* 2022).

Remarks. *Helix shuttleworthi* is a junior synonym of *Drepanotrema anatinum*, which has a nearly identical shell (compare Fig. 2A, B with Breure *et al.* 2022: fig. 93). Barbosa (2014) previously commented that *Helix shuttleworthi* might not be a typical representative of *Guestieria*.

DISCUSSION AND CONCLUSION

The purpose of this paper is to revise two poorly known scolodontid genera that are visually similar on first sight. In contrast to the earlier paper on *Happia* and allies (Roosen & Breure 2024), were no complex nomenclatural issues. However, there are some issues still needing to be addressed.

There are indications that the six *Guestieria* species, as recognized here, may belong to more than one genus. The shell of *G. powisiana* has a maximum size of 18 mm and is yellow-brownish (Pfeiffer 1851), while other taxa, like *G. martinida*, barely reach 2–3 mm and are transparent-whitish (Jousseume 1887; Roosen 2019). Such differences in size and colour are used to separate *Systrophhiella* Baker, 1925 from *Scolodonta* Doering, 1875 and *Drepanostomella* Bourguignat, 1890 from *Hirtudiscus* Hylton Scott, 1973 (Roosen & Breure 2024; this paper). In those cases, separation at the generic level is always corroborated by protoconch and teleoconch sculpture. However, this is not possible with

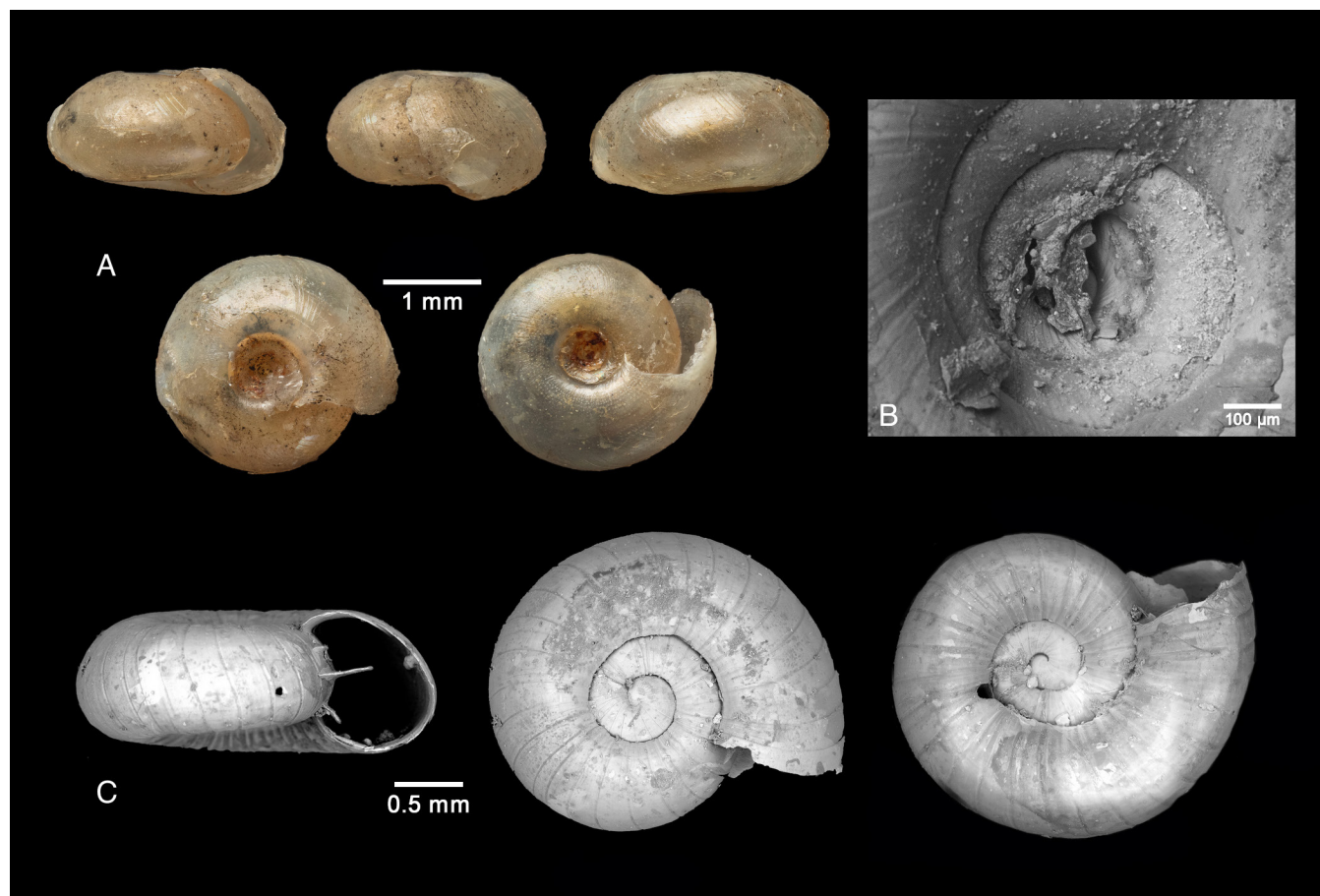


Figure 2. A, B, *Helix shuttleworthi* (L. Pfeiffer, 1851), **syn. nov.** of *Drepanotrema anatinum* (d'Orbigny, 1835), NHMUK 1991115 (syntype), Bahia, Brazil. C, *Xenodiscula venezuelensis* Pilsbry, 1919, ANSP 105209 (syntype), Cariaquita, Venezuela, leg. Brown.

Guestieria, and we strongly encourage researchers to collect living snails for molecular study and anatomical comparison, which may clarify the generic placement of these species. The entire Scolodontidae requires the collection of new materials suitable for DNA sequencing. An integrative phylogenetic approach incorporating genomic data would provide further insights into our revised classification of this family, especially at the generic level.

Barbosa (2014) mentioned an undescribed species on Ilha Grande and in Teresópolis, Brazil, and attributed it to *Guestieria*. We agree with this generic placement, and we encourage Brazilian malacologists to investigate this species and, if possible, to formally describe it. This Brazilian species of *Guestieria* implies that it is likely that additional species occur in other biomes of this country. The currently known distribution of *Guestieria* is a biogeographic puzzle, and this is another reason why we encourage collecting in the western and central parts of Brazil.

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